Brett's Recommended Readings – December 2001

Bauer, S.B. and S.C. Ralph. 2001. Strengthening the use of aquatic habitat indicators in Clean Water Act programs. Fisheries 26(6): 14-25.
Brett's Take: Easy reading with few equations, conceptual.

ABSTRACT. The loss of freshwater fluvial habitats is generally regarded as a key factor in the precipitous decline of native salmonids in the northwestern United States. State and federal water quality regulations, under the authority of the Clean Water Act (CWA) could be more relevant to recovery of Pacific salmon if physical habitat quality was explicitly integrated into water quality standard. We examine the concept of incorporating instream habitat measures into water quality regulations since these standards are the foundation of CWA programs. Commonly measured instream habitat variables for salmonids (flow regime, habitat space, channel structure, substrate quality, streambank stability) were evaluated in terms of their suitability as water quality criteria. The basis for this evaluation focused on these indicators in light of their: (1) relevance to ecological requirements of salmonid fishes, (2) applicability to landscape processes and the stream network in which they occur, (3) responsiveness to human-caused stressors (linking cause v. effect), and (4) degree of measurement reliability and precision. Our evaluation suggest that most habitat indicators, as currently measured, do not meet these criteria due to limitations in the state of the science as well as constraints imposed by the existing framework for water quality standards. There is general agreement on salmonid habitat requirements and the effects of land use on these habitats; there is less certainty on quantifying the physical habitat quality and on the reliability of the habitat assessment techniques. These obstacles can be over come by applying the principles of landscape ecology and stream network classification to indicator development, identifying and quantifying reference area conditions at a regional scale, calibrating relevant indicators to specific locales, and developing systematic monitoring procedures to meet rigorous data quality objectives.

Hey, J. 2001. The mind of the species problem. Trends in ecology and evolution 16:326-329.
Brett's Take: Easy reading with few equations, conceptual.

ABSTRACT. The species problem is the long-standing failure of biologist to agree on how we should identify species and how we should define the word species. The innumerable attacks on the problem have turned the often-repeated question "what are species?" into a philosophical conundrum. Today, the preferred form of attack is the well-crafted argument, and debaters seem to have stopped inquiring about what new information is needed to solve the problem. However, our knowledge is not complete and we have overlooked something. The species problem can be overcome if we understand our own role, as conflicted investigators, in causing the problem.

Samson, F.B. and F. L. Knopf. 2001. Archaic agencies, muddled missions, and conservation in the 21st Century. Bioscience 51:869-873.
Brett's Take: Easy reading with few equations, conceptual.

INTRODUCTORY PARAGRAPH. Public lands (290 million ha) in the United States are administered almost entirely by four federal agencies: the US Forest Service (USFS) in the Department of Agriculture, the Bureau of Land Management (BLM), the US Fish and Wildlife Service (FWS), and the National Park Service (NPS) in the Department of the

Interior. These agencies are in varying stages of crisis because of unclear or contradictory agency missions, internal bureaucratic malfunctions, and overall lack of responsiveness – on the part of Congress and the public, as well as agencies – in meeting the foreseeable demands of the 21st century.

Ellison, A.M. 1996. An introduction to Bayesian inference for ecological research and environmental decision-making. Ecological Applications 6:1036-1046.
Brett's Take: Hard to read, many equations, great paper if you want to understand the Bayesian approach.

ABSTRACT. In our statistical practice, we ecologists work comfortable within the hypothetico-deductive epistemology of Popper and the frequentist statistical methodology of Fisher. Consequently, our null hypotheses do not often take into account pre-existing data and do not require parameterization, our experiments demand large sample sizes, and we rearly use results form one experiment to predict the outcomes of future experiments. Comparative statistical statements such as " we reject the null hypothesis at the 0.05 level," which reflects the likelihood or our data given out hypotheses, are of little use un communicating our results to nonspecialist or in describing the degree of certitude we have in our conclusions. In contrast, Bayesian statistical inference requires the explicit assignment of prior probabilities, based on existing information, to the outcomes of experiments. Such as assignment forces the parameterization of null and alternative hypotheses. The results of these experiments, regardless of sample size, then can be used to compute posterior probabilities of our hypotheses given the available the available data. Inferential conclusions in a Bayesian mode also are more meaningful in environmental policy discussions: e.g., " our experiments indicate that there is a 95% probability that acid deposition will affect northeastern forest." Based on comparisons with current statistical practice in ecology, I argue that a "Bayesian ecology" would (a) make better use of existing data; (b) allow stronger conclusions to be drawn from large-scale experiments with few replicates; and(c) be more relevant to environmental decision-making.

Green, R.H. 1984. Statistical and nonstatistical considerations for environmental monitioring studies. Environmental Monitoring and Assessment 4:293-301.
Brett's Take: Easy reading with few equations, conceptual.

ABSTRACT. In environmental studies statistics is too often used as a salvage operation, or as an attempt to show significance in the absence of any clear hypothesis. Good design is needed, not fancier statistics. Too often we pursue short-term problems that are in fashion rather than study long-term environmental deterioration that really matters. Since change- often unpredictable change- is an intrinsic part of nature, it is pointless to fight all environmental change. We must choose our level of concern and then influence environmental change where we can. The judgment on whether a given change is bad cannot be left to the statistician of to statistical tests; the politician in consultation with the ecologist are responsible for it. The statistical significance of a hypothesized impact-related change should be tested against year-to –year variation in the unimpacted situation rather than against replicate sampling error, This is another argument for long-term studies. Attributes of good design and appropriate criterion and predictor variables are discussed.